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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

10/773,230

02/09/2004

Masakazu Ushijima

0353-0202P

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10/04/2006

BIRCH STEWART KOLASCH & BIRCH  
PO BOX 747  
FALLS CHURCH, VA 22040-0747

EXAMINER

ALEMU, EPHREM

ART UNIT

PAPER NUMBER

2821

DATE MAILED: 10/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

|  |  |  |  |
|--|--|--|--|
| <p align="center"><b>Office Action Summary</b></p> | <p><b>Application No.</b></p> <p align="center">10/773,230</p> | <p><b>Applicant(s)</b></p> <p align="center">USHIJIMA ET AL.</p> |  |
|  | <p><b>Examiner</b></p> <p align="center">Ephrem Alemu</p>      | <p><b>Art Unit</b></p> <p align="center">2821</p>                |  |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 June 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,5-9,13,16- 29 and 31-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8,28 and 34 is/are allowed.
- 6) ☒ Claim(s) 1,2,6,9,11,13,17,23-29,31-33 and 35 is/are rejected.
- 7) ☒ Claim(s) 5,7,16 and 18-22 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                   | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>6/2006, 8/2006</u> .  | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, (i) the “shunt circuit formed by the multi-tier structure in combination with the shunt circuit formed in a turn around fashion” in a manner claimed in claims 5, 7 and 16; and (ii) the arrangement of “shunt transformer being configured to have three or more coils and in combination with multi-tier structure” in a manner claimed in claims 6 and 17, must be shown or the feature canceled from the claim. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Objections***

2. Claims 18, 19, 20-22 and 35 are objected to because of the following informalities:

In claims 8 and 35, lines 25 and 26, respectively, “shut” should be replaced with --shunt-- and/or corrected appropriately to correct minor typographical error. Appropriate correction is required.

In claim 18, lines 2-4, “when a shunt circuit... ....multi-tier structure,” should be canceled in order to avoid redundancy since independent claim 1 recite this arrangement. Appropriate correction is required.

In claim 11 and 23, line 4, respectively, “the other end of said diode being connected into one” is incomplete. Appropriate correction is required.

In claims 19, 20 and 22, lines 2-3, respectively, “when said shunt circuit are connected to form multi-tier structure,” should be canceled in order to avoid redundancy since independent claim 1 recite this arrangement. Appropriate correction is required.

In claim 21, lines 2-4, “when a shunt circuit... ....multi-tier structure, and” should be canceled in order to avoid redundancy since independent claim 1 recite this arrangement. Appropriate correction is required.

In claim 35, lines 3-4, “the inverter” lacks antecedent basis.

Applicant cooperation is requested to review all the claims in order to avoid minor informalities and/or indefiniteness. Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (US 6,717,372).

Re claim 35, Lin discloses a surface light source system (i.e., multi-lamp driving system for LCD backlight systems) (Figs. 3-6), comprising:

two coils (W1, W2) connected to a secondary winding of a step-up transformer (T1) of the inverter circuit (i.e., driving circuit 10) are arranged, and magnetically coupled to each other to form a shunt transformer (i.e., current balance circuit 50) for shunting current such that magnetic fluxes generated thereby are opposed to each other to cancel out, and an inverter module (20, T1) including: discharge lamps (Lp1, Lp2) are connected to the coils (W1, W2), respectively, with currents flowing therethrough being balanced with each other, wherein a large number of discharge lamps are arranged in a surface light source (i.e., for LCD backlight systems) (Figs. 3-6; Col. 1, lines 12-18; Col. 2, line 45- Col. 3, line 44),

an electric conductor being arranged adjacent to the discharge lamps (Figs. 3-6), wherein parasitic capacitances (i.e., which is inherent in high voltage carrying conductor) are generated between the discharge lamps and the adjacent conductor, the parasitic capacitances (i.e., which is inherent in high voltage carrying conductor) being added to each other as appropriate via the shunt transformer (50) (Figs. 3-6; Col. 2, line 45- Col. 3, line 44),

wherein an impedance characteristic of an electrode portion of each of said discharge lamps and a positive column (i.e., which is also inherent feature of the CCFL discharge lamps) has a negative resistance characteristic (i.e., which is inherent characteristic for the CCFL

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discharge lamps), and wherein lighting of each of the discharge lamps is caused by the fact that a reactance of an inductance related to balancing operation of the shunt transformer (W1, W2), the reactance being in an operating frequency of the inverter circuit, exceeds a negative resistance of each of the discharge lamps (Figs. 3-6; Col. 2, line 45- Col. 3, line 44).

Although, Lin does not mention a shunt circuit board module, Lin clearly shows two coils (W1, W2) connected to a secondary winding of the step-up transformer (T1) of the inverter circuit (i.e., driving circuit 10) being arranged independent of the inverter module as illustrated in the Figs. 3-6, within the dashed line (50, 50'). Therefore, providing shunt circuit board (i.e., balance circuit 50 50') being placed on a side of the surface light source (i.e., multi-lamp driving system for LCD backlight systems) would have been an obvious design choice for the purpose of balancing the current passing through the light source.

5. Claims 1, 2, 6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (US 6,717,372) in view of Japanese patent publication no. 63-105498, submitted by applicant.

Re claim 1, Lin discloses an inverter circuit for discharge lamps (i.e., multi-lamp driving system) for multi-lamp lighting (Figs. 3-6).

wherein two coils (W1, W2) connected to a secondary winding of a step-up transformer (T1) of the inverter circuit (i.e., driving circuit 10) are arranged, and magnetically coupled to each other to form a shunt transformer (i.e., current balance circuit 50) for shunting current such that magnetic fluxes generated thereby are opposed to each other to cancel out, and discharge lamps (Lp1, Lp2) are connected to the coils (W1, W2), respectively, with currents flowing therethrough being balanced with each other, wherein a large number of discharge lamps are

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arranged in a surface light source (i.e., for LCD backlight systems) (Figs. 3-6; Col. 1, lines 12-18; Col. 2, line 45- Col. 3, line 44),

an electric conductor being arranged adjacent to the discharge lamps (Figs. 3-6), wherein parasitic capacitances (i.e., which is inherent in high voltage carrying conductor) are generated between the discharge lamps and the adjacent conductor, the parasitic capacitances (i.e., which is inherent in high voltage carrying conductor) being added to each other as appropriate via the shunt transformer (50) (Figs. 3-6; Col. 2, line 45- Col. 3, line 44),

wherein an impedance characteristic of an electrode portion of each of said discharge lamps and a positive column (i.e., which is also inherent feature of the CCFL discharge lamps) has a negative resistance characteristic (i.e., which is inherent characteristic for the CCFL discharge lamps), and wherein lighting of each of the discharge lamps is caused by the fact that a reactance of an inductance related to balancing operation of the shunt transformer (W1, W2), the reactance being in an operating frequency of the inverter circuit, exceeds a negative resistance of each of the discharge lamps (Figs. 3-6; Col. 2, line 45- Col. 3, line 44).

Lin does not show the plurality of shunt transformers being arranged in the form of a tournament tree, whereby shunt transformer are sequentially connected to each other to form a multi-tier structure, in a manner claimed in claim 1.

The Japanese patent publication no. 63-105498 discloses in Fig. 3, a multi-tier structure arrangement as claimed in claim 1.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the shunt transformer arrangement of Lin as taught by the 63-105498 of the Japanese patent publication for no other reason than driving multiple lamps.

Re claim 2, given Lin's modified by the 63-105498 of the Japanese patent publication inverter circuit for discharge lamps (i.e., multi-lamp driving system) for multi-lamp lighting, as discussed above in claim 1, when one of the discharge lamps connected to the shunt transformer is not lighted, a core of the shunt transformer being saturated by a current flowing through a lighted one of the discharge lamps, whereby a voltage having a high peak value being generated at a terminal of the unlighted discharge lamp of the shunt transformer, thereby applying a high voltage to the unlighted discharge lamp would have been obvious for no other reason than starting the un-lighted lamp.

Re claims 6 and 17, Lin further shows the shunt transformer (50') configured to have three or more coils (W1, W2, W3, ... Wn) arranged such that magnetic fluxes generated by the respective coils (W1, W2, W3, ... Wn) are opposed to each other to cancel out, whereby respective lamp currents (I1, I2, I3, ... In) of discharge lamps (Lp1, Lp2, Lp3, ... Lpn) connected to the coils are simultaneously balanced with each other (Fig. 6; Col. 3, lines 29-44).

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (US 6,717,372) in view of Japanese patent publication no. 63-105498, submitted by applicant, further in view of Takeda et al. (US 2003/0137222).

Re claim 9, Lin or the 63-105498 of the Japanese patent publication does not show the step-up transformer being replaced by a piezoelectric transformer.

Takeda discloses and teaches the use of a compact and high-power piezoelectric transformer to replace conventional step-up transformer for an inverter of a backlight source of a liquid crystal display panel for the purpose of realizing a step-up circuit higher in circuit efficiency than using the conventional step-up transformer (Fig. 1; page 26, paragraph 272).



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It would have been obvious to one having ordinary skill in the art at the time the invention was made to replace the step-up transformer of Lin's in view of the 63-105498 of the Japanese patent publication with piezoelectric transformer as taught by Takeda for the purpose of realizing a step-up circuit higher in circuit efficiency than using the conventional step-up transformer as taught by Takeda.

7. Claims 13, 29 and 31-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (US 6,717,372) in view of Japanese patent publication no. 63-105498, submitted by applicant, further in view of Yer et al. (US 2002/0140538 submitted by applicant).

Re claims 13, 29, 31, 32, 33 and 34, Lin or the 63-105498 of the Japanese patent publication does not mention the two coils of the shunt transformer having obliquely-wound windings.

Yer teaches a method of winding a coil of transformer in an obliquely wound windings for the purpose of reducing power consumption as well as improving efficiency over the conventional transformer (paragraphs [0012], [0053], [0060]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the shunt transformer of Lin's in view of the 63-105498 of the Japanese patent publication by shunt transformer having an obliquely wound windings as taught by Yer for the purpose of reducing power consumption as well as improving efficiency over the conventional transformer as taught by Yer. Further, given Lin's in view of the 63-105498 of the Japanese patent publication further in view of Yer, two coils of each shunt transformer having obliquely-wound windings would have been obvious.

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8. Claims 11 and 23-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (US 6,717,372) in view of Japanese patent publication no. 63-105498, submitted by applicant, further in view of Tsai (US 6,459,216).

Re claims 11, 23, 24, 25, 26, 27 and 28, Lin or the 63-105498 of the Japanese patent publication does not teach of to include a diode to form a detection circuit for detecting a voltage generated when any one of the discharge lamp becomes abnormal.

Tsai discloses a known system having protection circuit including a diode for the purpose of protecting against failure of components when the discharge lamp becomes abnormal (Fig. 1; Col. 2, lines 1-13).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the inverter circuit for discharge lamps (i.e., multi-lamp driving system) of Lin's in view of the 63-105498 of the Japanese patent publication by providing protection circuit including a diode as taught by Tsai for the purpose of protecting against failure of components when the discharge lamps becomes abnormal.

***Allowable Subject Matter***

9. Claims 8, 28 and 34 are allowed.

10. Claims 8, 18, 19, 20, 21 and 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Response to Arguments***

11. Applicant's arguments with respect to claims 1, 2, 5-7, 9, 11, 13, 16, 17, 23-27, 29, 31-33 and 35 have been considered but are moot in view of the new grounds of rejection.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ephrem Alemu whose telephone number is (571) 272-1818. The examiner can normally be reached on M-F 9:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy P Callahan can be reached on (571) 272-1740. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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TUYET VO  
PRIMARY EXAMINER